



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/370,508	08/06/1999	UMESH SHARMA	20944.9000	8186

7590 11/23/2001

SCOTT A. HORSTEMEYER
THOMAS, KAYDEN, HORSTEMEYER & RISLEY
100 GALLERIA PARKWAY
SUITE 1750
ATLANTA, GA 30339

EXAMINER

DEO, DUY VU

ART UNIT	PAPER NUMBER
----------	--------------

1765

DATE MAILED: 11/23/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/370,508

Applicant(s)

SHARMA ET AL.

Examiner

DuyVu n Deo

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 October 2001.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 14-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 11-13 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. This application contains claims 11-13 drawn to an invention nonelected with traverse in Paper No. 3. A complete reply to the final rejection must include cancelation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 18 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. It is unclear where in the specification teaching of forming a gate above the semiconductor substrate and forming a first polysilicon layer over the gate.

Claim Rejections - 35 USC § 112

4. Claim 2 recites the limitation "...prior to the step of removing the remaining anti-reflective coating" in line 4. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 1765

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1-6, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (US 5,620,913) and Fu et al. (US 6,245,682).

Lee teaches a method for making a flash memory comprising: forming a silicon nitride overlying the substrate; depositing a layer of polysilicon overlying the silicon nitride layer; forming a photoresist mask coating over the polysilicon; patterning the poly and the silicon nitride layer; removing the mask (col. 6, line 1-35). Unlike claimed invention, Lee doesn't describe forming an ARC over the poly layer. Fu teaches a method of poly etch wherein he teaches forming an oxide layer over the poly and a second silicon oxynitride over the oxide layer. They are patterned by using a resist layer. The silicon oxynitride layer is later removed with hot phosphoric acid (ab.; col. 4, line 30-35; col. 5, line 1-30). It would have been obvious at the time of the invention for one skill in the art to modify Lee in light of Fu because Fu teaches that the oxynitride as an ARC would help to avoid the problem of distorted photoresist images due to reflections from the underlying semiconductor substrate; during the photolithographic definition of sub-micron poly gates (col. 2, line 60-68) and the oxide layer would help to protect the poly gate when the oxynitride is being removed by phosphoric acid (col. 5, line 10-20). Even though Fu doesn't describe removing the oxynitride before subjecting the layer of oxynitride to any temperature greater than about 400 degrees Celsius; the combined method above has the same steps as that of claimed invention; therefore, it would inherently not have any step that would subject the silicon oxynitride to any temperature greater than about 400 degree Celsius between the deposition and removing.

Fu also teaches of forming a layer of insulator on the edge of the poly prior to the step of removing the oxynitride (col. 5, line 11-19). The depositing of silicon oxide using TEOS source is well known to one skill in the art (please see Adkisson et al. col. 3, line 66-col. 4, line 1).

Referring to claim 3, since depositing and etching (by RIE) an insulating layer such as oxide layer is well known and available to one skill in the art, therefore, at the time of the invention, an oxide layer can be deposit on the pattern structure and the edge with an anticipation of an expected result. As suggested by Fu, the insulator or oxide layer on top of the oxynitride would have to be removed in order to remove the oxynitride while the oxide layer protect the poly pattern.

7. Claims 7-9, 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee and Fu as applied to claims 1 and 14 above, and further in view of Cheung et al. (US 5,968,324).

Cheung teaches a method of forming oxynitride using SiH_4 and N_2O wherein the ratio between them is about 1.0 and Cheung further teaches that the refractive index, absorptive index, and thickness for different wavelengths can be controlled by varying the parameters and the rate at which the gases are introduced (col. 3, line 1-5; col. 4, line 1-33). It would have been obvious at the time of the invention for one skill in the art to deposit the oxynitride in light of Cheung because Cheung further teaches the parameters for the deposition of the oxynitride that is used by above prior art.

8. Claims 10, 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adkisson et al. (US 6,030,541).

Adkison teaches a method of forming a semiconductor device comprising: depositing an oxide layer from TEOS of about 100-1000 angstrom; depositing an oxynitride layer of about 100-2000 angstrom over the oxide layer; depositing a resist pattern over the oxynitride; patterning the oxide and the oxynitride layer; removing the oxynitride by using phosphoric acid (col. 3, line 50-col. col. 5, line 50). Unlike claimed invention, Adkison doesn't describe removing the oxynitride before the oxynitride is subjected to any temperature greater than about 400 degrees Celsius. Since Adkisson teaches the same steps as that of claimed invention, the method would inherently not having any step that would subject the silicon oxynitride to any temperature greater than about 400 degree Celsius between the deposition and removing the oxynitride layer.

9. Claims 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Adkisson as applied to claim 14 above, and further in view of Cheung et al. (US 5,968,324).

Cheung teaches a method of forming oxynitride using SiH_4 and N_2O wherein the ratio between them is about 1.0 and Cheung further teaches that the refractive index, absorptive index, and thickness for different wavelengths can be controlled by varying the parameters and the rate at which the gases are introduced (col. 3, line 1-5; col. 4, line 1-33). It would have been obvious at the time of the invention for one skill in the art to deposit the oxynitride in light of Cheung because Cheung further teaches controlling the parameters for the deposition of the oxynitride that is used by above Adkison in order to control the refractive index, the absorptive index, and the thickness of the oxynitride.

10. Wolf is cited to show that RIE of insulator (such as silicon oxide) is known and available to one skill in the art (pages 539-542).

Response to Arguments

11. Applicant's arguments filed 10/9/01 have been fully considered but they are not persuasive.

Referring to rejection of claims 1 and 14 under Lee and Fu, Fu describes removing the SiON in hot phosphoric acid at a bath T of about 100-150 degrees F. This would read on claims 1 and 14 of removing the SiON in hot phosphoric acid before subjecting the SiON to any T greater than about 400 degrees Celsius since the only T that the SiON being subjected to is from 100-150 degrees F.

Referring to the argument of claim 10, in Adkisson, the steps that are between depositing and removing the silicon oxynitride is the processing of photoresist. It is conventional that the processing of photoresist is done with T that is under 400 degrees Celsius. As evident supported by Wolf (pg 429-455, pg 518). Therefore, between the steps of depositing and removing the silicon oxynitride, Adkisson's method describes that the SiON is not subjected to any T greater than 400 degrees Celsius. Referring to rejection of 14 under Adkisson, the step of removing SiON under hot phosphoric acid would read on claimed of etching the second layer, SiON in hot phosphoric acid before the SiON is subjected to any T greater than about 400 degrees C since there is no other processes other than the process of etching SiON in hot phosphoric acid.

Allowable Subject Matter

12. Claims 18-25 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action.

Claims 18-25 are allowable because Fu doesn't describe "removing the ARC, SiON without applying an oxide between the formation of the ACR and the removal of the ARC." Fu describes forming an oxide before the removal of ARC so that the oxide can protect the exposed wall surfaces of the poly gate feature from being attacked during the removal of ARC.

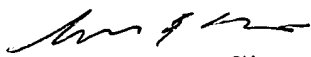
Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD
November 8, 2001


BENJAMIN L. UTECH
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700